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**Tropical Ecology and Society
Reconciling Conservation and
Sustainable Use of Biodiversity**

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ABSTRACTS**

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O70-03 – S70 Free session: *Habitat fragmentation and biodiversity*
Thursday 23 June / 08:00-10:00 – Barthez

Connectivity modelling of pollination services in a tropical landscape

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Protecting pollinators to stabilize crop production is a critical strategy reconciling conservation and agricultural priorities. However, in complex agricultural landscapes, the heterogeneous distribution of resources and pollinators often leads to a disparate delivery of the pollination service. An integrated management of this ecosystem service at the farm and landscape level would require a better understanding of its underlying mechanisms.

In this study, we explored how forest patches, coffee agroforests and other components of the agro-ecological matrix influence the abundance of pollinators in coffee plantations in the Kodagu district, India. We implemented a probabilistic model of dispersion of honeybees from their nesting habitats to the target flowers using the novel circuit theory. Within this framework, we distinguished between two types of resistance surfaces influencing ecological flows: a matrix resistance representing the permeability to movement and a ground resistance representing the attractiveness for forage in a given patch. We derived the resistance surfaces based on the following landscape characteristics: percentage of forest cover, land-use types, and probability of coffee flowering. We interpreted the model output as the probability of a bee foraging in a patch. We used field data on bee activity in 110 coffee plantations to parametrize the resistance surfaces and validate our results.

Our analyses indicated that temporal changes in floral availability throughout the season is the main factor influencing bee abundance and explained at least 55% of the variance among coffee plantations. However, none of the other landscape characteristics improved significantly the predictions on bee visit. The circuit theory model provides a simple mechanistic approach to simulate how pollinators adapt their foraging distance to their environment. The approach has useful implications for the management of pollination services at the landscape scale, and in particular on the coordination of the date of irrigation and subsequent coffee blossom between farmers.

O70-04 – S70 Free session: *Habitat fragmentation and biodiversity*
Thursday 23 June / 08:00-10:00 – Barthez

Multi-scale approach of crop microclimates in complex agro-ecological landscapes in Ecuador: towards new pest management strategies?

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Microclimates have long been recognized in controlling the physiology and ecology of species. However, in the context of global warming and increasing climatic variability, a major uncertainty that hampers effective pest management is related to the thermal characteristics of agricultural landscapes, which are known to have profound effects on insect pest dynamics. Here, we addressed the issue of considering microclimates experienced by crop pests in their environments to infer their distribution and develop innovative pest control strategies based on processes of thermal agro-ecology.

We assessed the heterogeneity of microclimates experienced by pests and natural enemies in complex agricultural landscapes of Ecuador (from 2800 to 3600 m.a.s.l.), made of various crop types and natural habitats. The assessment of microclimates was performed at the agrosystem, crop field, and plant scales using a combination of UAVs, thermal cameras and temperature micro-loggers. Then, we determined the relationship between microclimates heterogeneity (characterized using spatial metrics) and pest occurrences (measured in the field with pheromone traps and local plant samplings).

Results revealed that microclimates heterogeneity must be taken into consideration when estimating ectotherm occurrences. Indeed, at the landscape scale, microclimates of crops and natural habitats substantially affect pest dynamics. At the field scale, the spatial metrics shaping microclimatic conditions are significantly related to pest occurrences. And at the plant scale, we found that pests can access in their close vicinity (<1.2 m) most of the thermal micro-environments recorded at the field level.

In complex agro-ecological landscapes, there is likely a wide range of microclimatic conditions resulting in the presence of locally-suitable and unfavourable conditions for ectotherms (crop pests but also natural enemies), the existence of which might not be apparent at a coarser resolution. Consequently, this work stresses the need of a better incorporation of microclimatic data into models of species distribution (and vulnerability to climate change) and evidences that microclimates might provide new leverage for innovative agro-ecological pest management.